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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/799,876	03/15/2004	Masayuki Nakamoto	250291US2SRD CONTINUATION	8344

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EXAMINER	
GUHARAY, KARABI	

ART UNIT	PAPER NUMBER
2879	

DATE MAILED: 11/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/799,876	NAKAMOTO, MASAYUKI	
	Examiner	Art Unit	
	Karabi Guharay	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 12-17* is/are rejected.

7)☒ Claim(s) *9-11 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 09/987,862.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *5/7/04 & 3/15/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Preliminary Amendment, filed on 15 March 2004 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-7 & 12-14 are rejected under 35 U.S.C. 102(e) as being anticipated by Kawate et al. (US 2002/0060516).

Regarding claim 1, Kawate discloses a field emission cold cathode device of a lateral type (Fig 6) comprising a support substrate 1, a cathode electrode 3 disposed on the support substrate 2, and having a first side surface, a gate electrode 2 disposed on the support substrate 1, disposed laterally side by side with the cathode electrode 3 and having a second side surface opposing the first side surface and an emitter (4, 5 of Fig 3B) disposed on the first side surface to oppose the second surface, the emitter comprising a metal plating layer 5 formed on the first side surface and a plurality of granular or rod-shaped micro-bodies 4 (carbon fiber grown on a catalyst nuclei) supported in the metal plating layer 5 in a dispersed state, the micro-bodies consisting essentially of a metal material (see paragraph 80 of page 5- end of paragraph 82 on page 5, and paragraph 45 of page 2).

Regarding claim 2, Kawate discloses that the metal material is selected from Ti or Pd as the nuclei for the growth of carbon fiber (paragraphs 45-47).

Regarding claim 3 Kawate discloses that the micro-bodies are granular bodies and have a radius of not more than 100nm (paragraph 192).

Regarding claims 4, Kawate discloses that micro-bodies are rod-shaped and having a radius of curvature of not more than 50nm (paragraph 194).

Regarding claim 6, Kawate discloses that the microbodies are carbon nanotubes and carbon fibers are oriented in different angles with respect to support substrate ranging from 20 to 160 degrees (see Fig 11 & Fig 12).

Regarding claim 7, Kawate discloses that metal plating layer 5 comprises a resistance ballast layer (metal oxide at the interface with carbon fiber) containing an additive (oxygen), which increases resistance of the metal plating layer (paragraph 45 of page 2).

Regarding claim 12, Kawate further discloses a surrounding member 92 (Fig 9) cooperating with the support substrate 81 to from a vacuum discharge space 97 that surrounds the cathode electrode 3, the gate electrode 2 and the emitter (4, 5) and an anode electrode (61 of Fig 6, not shown in Fig 9) disposed on the surrounding at a position opposing the cathode electrode and the gate electrode (see Fig 9, and paragraph 148).

Regarding claim 13, Kawate discloses a vacuum micro-device (Fig 9, and Fig 6) comprising a support substrate 1, a cathode electrode 3 disposed on the support substrate 2, and having a first side surface, a gate electrode 2 disposed on the support

substrate 1disposed laterally side by side with the cathode electrode 3 and having a second side surface opposing the first side surface and an emitter (4, 5 of Fig 3B) disposed on the first side surface to oppose the second surface; the emitter comprising a metal plating layer 5 formed on the first side surface and a plurality of carbon nanotubes 4 supported in the metal plating layer 5 in a dispersed state (see paragraph 80 of page 5- end of paragraph 82 on page 5, and paragraph 45 of page 2), a surrounding member 92 (Fig 9) cooperating with the support substrate 81 to from a vacuum discharge space 97 that surrounds the cathode electrode 3, the gate electrode 2 and the emitter (4, 5) and an anode electrode (61 of Fig 6, not shown in Fig 9) disposed on the surrounding at a position opposing the cathode electrode and the gate electrode (see Fig 9, and paragraph 148).

Regarding claim 14, Kawate discloses that the surrounding member 97 (Fig 9) comprises a transparent opposite substrate (face plate 96, inherently transparent for light emission from the phosphor) and the anode electrode is a transparent electrode and a fluorescent layer 94 disposed on the opposite substrate 96 in the vacuum discharge space 97 (see paragraph 152).

Claim 15 recites essentially the same limitations of claim 2, thus claim 15 is rejected as claim 2 (see rejection of claim 2).

Claim 16 recites essentially the same limitations of claim 3, thus claim 16 is rejected as claim 3 (see rejection of claim 3).

Claim 17 recites essentially the same limitations of claim 4, thus claim 17 is rejected as claim 4 (see rejection of claim 4).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawate as applied to claim 1.

Regarding claim 8, Kawate discloses all the limitations of claim 8, and further teaches an additive material (formation of oxide) which increases the resistivity as in case of applicant's metal plating layer (see rejection of claim 7), but is silent about resistivity of the metal plating layer. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the range of resistivity since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. ***MPEP 2144.05 II A***

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kawate as applied to claim 1 above, and further in view of Zhou (US 6787122).

Regarding claim 5, Kawate discloses all the limitations of claim 5, except for a conductive filler inside the carbon naotubes.

However, in the same field of field emission electrodes, Zhou teaches that the carbon nanotubes having conductive fillers inside the tube reduces work function of the

carbon nanotube emitters, thus reducing threshold field emission voltage and also increases the electron emission site density (see Abstract).

Thus, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include conductive filler in the carbon nano-tube emitters of Kawate's device as taught by Zhou, since this will reduce the work function and electron emission site density of the emitter.

Allowable Subject Matter

Claims 9-11& 18 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claims 9-11 & 18, the prior art of record neither shows nor suggests a lateral type cold cathode field emission device comprising all the claimed limitations of claims 9-11, and 18, particularly further limitations claimed in claims 9-11 & 18.

Other Prior Art Cited

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure : Gao et al. (US 6361861); Ajayan et al. (US 5457343).

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karabi Guharay whose telephone number is (571) 272-2452. The examiner can normally be reached on Monday-Friday 8:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Karabi Guharay

Karabi Guharay
Patent Examiner
Art Unit 2879